Mountain Valley Stone

Large Mine Permit

MVS
m/043/019

Notice of Intention to Commence large Mining Operations

R647-4-104 Operator(s), Surface and Mineral Owners

1. Mine Name: Browns Canyon
2. Name of applicant or Company: Mountain Valley Stone, Inc.
3. Permanent Address: 2276 South Daniels Road
   Heber City, Utah 84032
4. Company Representative (or designated operator)
   Robert John Hicken
   President
   2276 South Daniels Road
   Heber City, UT 84032
   (435) 654-0120
   (435) 654-3337 Fax
5. Location of Operation:
   Summit County
   Township 1 South, Range 5 East
   Southwest ¼ Section 20
6. Ownership of the Land surface: Private
   John Hut
   4316 South Adonis Drive
   Holladay, UT 84124
7. Owner(s) of record of the minerals to be mined:
   Wright Garff Resources
   1675 North Beck Street
   Salt Lake City, UT 84116-1214
8. Have the above owner(s) been notified in writing? Yes
9. Does the operator have legal right to enter and conduct mining operations on the land covered by this notice? Yes

R647-4-105 Maps, Drawing & Photographs

105.1 Base Map (Fig.1)

a. Property boundaries of surface ownership of all lands which are to be affected by the mining operations.
b. Perennial, intermittent, or ephemeral streams, springs and other bodies of water; roads, buildings, landing strips, electrical transmission lines, water wells, oil and gas pipelines, existing wells or boreholes, or other existing surface or subsurface facilities within 500 feet of the proposed mining operations;
c. Proposed route of access to the mining operations from the nearest publicly maintained highway.
d. Known areas which have been previously impacted by mining or exploration activities within the proposed land affected.
e. Areas proposed to be disturbed or reclaimed over the life of the project or other suitable time period.

105.2 Surface Facilities Map (Fig.2)

a. Proposed surface facilities, including but not limited to: buildings, stationary mining/processing equipment, roads, utilities, power lines, proposed drainage control structures, and the location of topsoil storage disposal areas for overburden/waste dumps, tailings or processed waste facilities, disposal areas for overburden, solid and liquid wastes, and wastewater discharge treatment and containment facilities.

b. A border clearly outlining the extent of the surface area proposed to be affected by mining operations, and the number of acres proposed to be affected.

c. The location of test borings, pits, or core holes.

105.3 Additional Maps Reclamation Treatments (SP2, SP3, SP4)

a. Areas of the site to receive various reclamation treatments shaded, crosshatched or color-coded to identify which reclamation treatments will be applied. Areas would include: buildings, stationary mining /processing equipment, roads, utilities, proposed drainage improvements or reconstruction, and sediment control structures, topsoil storage areas, waste dumps, tailings or processed waste and wastewater discharge, treatment and containment facilities. Reclamation treatments may include ripping, regrading, replacing soil, fertilizing, mulching, broadcast seeding, drill seeding, and hydro seeding.

b. A border clearly outlining the extent of the area to be reclaimed after mining, the number of acres disturbed, and the number of acres proposed to be reclamation.

c. Areas disturbed by this operation which are included in a request from a variance from the reclamation standards.

d. High walls which are proposed to remain steeper than 45 degrees and slopes which are proposed to remain steeper than 3 horizontal: 1 vertical.

R647-4-106 Operation Plan

106.1 Minerals to be mined: Sandstone

106.2 Type of operation: Material is to be pulled off the high walls with a track hoe and moved to one of three areas via a Front End Loader. Landscape material is moved to one side and stock piled. Other materials are taken to the Guillotine or the splitting area for flag production.
Equipment to be used:

2 Front End Loaders	6 Track Hoes
2 Fork lift/ Loaders	3 Guillotines
2 Skid Steers	1 Wire Saw
1 Tumbler Machine	1 Haul Truck

106.3 Approximate Acreage

	Current
Areas of actual mining	9.04 acres
Overburden dumps	2.52 acres
Access/haul roads, storage areas	2.6 acres
Proposed future mining	18.84 acres
Total actual Five year Acreage	33 acres
Total actual Life of Mine Acreage	126.2 acres

106.4 Nature of material including waste rock/overburden and estimated tonnage

Waste material in the form of fines and rock is pulled off the high wall along with the usable sandstone. This overburden is made up of about 60% fines and 40% rock waste.

Thickness of Overburden:	75 feet
Thickness of mineral deposit:	unknown
Estimated annual volume of overburden	10,000- 60,000 tons
Estimated annual volume of tailings	30,000- 50,000 tons
Estimated annual volume of ore	10,000- 20,000 tons

106.5 Existing soil types, location of plant growth material

See Appendix #1

106.6 Plan for protecting and redepositing existing soils

Thickness of soil material to be salvaged and stockpiled: 6 inches
Area from which soil material can be salvaged: (see map Fig1)
Volume of soil to be stockpiled: As necessary

Soil will be scraped off from above the high wall prior to moving the wall, and also scraped off from in font of the overburden as it moves. As quarrying activities progress, current stockpiles will be bermed and stockpiled at the sides of the quarrying activities or in an area clear of the mining operation. Minimize stockpiles sides to a 2 to 1 slope for erosion control. Stockpiles will be seeded with a quick growing ground cover (i.e. yellow sweet clover, alfalfa, and orchard grass).

106.7 Existing vegetative communities to establish revegetation success

Vegetation

There are 2.62 acres of wetlands on the proposed mining area. We will not disturb these areas until properly permitting with Army Corp and the State of Utah.

To estimate vegetation on a nearby-undisturbed area not considered wetland, a total of 15 transects were used. The most frequently observed species was sagebrush. The only other species sampled in the shrub layer was serviceberry, blue bunch, wheat grass, Kentucky blue grass, and Oregon grape. The average ground cover was 52%.

Ground Cover Table:

Total Vegetation Cover < 1m	52
% Grass cover	46
% Herb cover	2
% Woody species cover in ground layer	4
% Litter	33
% Rock	15
% Bare Ground	<1

106.8 Depth of groundwater, overburden material & geologic setting

The operation is on a rocky hillside with little ground above it to produce ground water. The seasonal waterways that exist have an estimated flow of 5 gallons an hour.

Mountain Valley Stone put in a water well the spring of 2006. The well was dug to 200 feet. Water was struck at 30 feet. The water will be used for dust control and other mining needs throughout the quarry. The well has an 8" casting diameter.

Sandstone is quarried from the Jurassic-Triassic nugget sandstone. The nugget sandstone is thickly bedded mostly buff colored sandstone at the site of this quarrying operation. There are small areas of red colored sandstone, variable buff to red colored sandstone, and sandstone with concentric rings colored by iron oxides. All the salable stone is from the nugget sandstone.

The nugget sandstone has been widely replaced by intruded Tertiary andesites. The andesites are strongly weathered near the surface, and have decomposed into thick layers of clays. This is all waste material. Much of the waste identified as fine rock comes from Tertiary andesites.

106.9 Location and size of ore and waste stockpiles, tailings and treatment ponds, and discharges. (Fig 1, Fig 2)All overburden is crushed and sold as a byproduct by a secondary contractor.

R647-4-107 Operation Practices

Describe measures taken to minimize hazards to public safety during mining operations regarding:

107.1 Public Safety and Welfare

Signs will be posted at the entrance of the operation stating that heavy equipment is in use and that blasting activities may periodically take place at the site.

Shafts and Tunnels: None will be installed
Disposal of Trash: Trash and other manmade waste material will be hauled to the proper landfill.
Plugging or capping of drill, core or other exploratory holes: None will be created.

Posting of appropriate warning signs: All proper warning signs will be maintained in and around fuel tanks and stationary equipment.

Construction of berms, fences, and barriers: Berms will be maintained were they are required, along roadway and top edge of overburden dumping site.

Describe measures taken to avoid or minimize environmental damages to natural drainage channels, which will be affected by this mining operation: Drainage channels are not located in the proposed mining area.

Identify any potentially deleterious materials that may be stored on site and describe how they will be handled and stored: We will have gasoline and diesel fuel on site and also a small amount of motor oil for use in the loaders, backhoes, and skidsteers. The oil will be stored in its original containers and kept on a shelve in the mechanics storage area. The gasoline and diesel will be stored in two mobile above ground tanks with required catch tubs under each tank. The smaller tank is located in a cattle trough adequate to contain 110% of the total tank contents. The diesel fuel tank is mounted upon an earth berm, lined with visquene and back filled with gravel. Sufficient area has been provided to maintain at least 110% of the total tank contents.

All blasting is done by contract such that no powder magazines are kept onsite.

107.5 Suitable soils removed and stored

We will grade off topsoil above the high wall as it moves into the hill, and also the soil in front of the overburden as it moves out. This soil will be stockpiled and sloped at a 2 to 1 minimize erosion and allowing overgrowth to grow to further help holding the soil in place. Seeding of top soil berms will also be used to further minimize erosion.

Describe any reclamation to be done during active mining operations prior to final closure: As our mining progresses and it becomes evident that we have areas that will not be affected by further mining operations, this area will be reclaimed by replacement of topsoil and reseeding.

R647-109 Impact Statement

109.1 Surface and groundwater systems:

Mountain Valley Stone will do everything in its power to leave undisturbed all wetland areas. There will be a 20 foot buffer placed around all wetlands. There will also be an erosion fence placed at the 20 foot buffer.

Mountain Valley Stone has dug a water well. The well was dug to 200 feet; water was struck at 30 feet. The well was dug following all frilling regulations placed by the state. Mountain Valley Stone has also purchased 2 acre feet of water right through Weber Basin Water District to use commercially. The water right number is 31360; the state well permit number is 35-11950 (E4677). The well was dug into unconsolidated material above the nugget.

109.2 Wildlife habitat and endangered species:

The area we are mining in does have wetland area in it, but it will not be disturbed unless properly permitted for. We will keep a 20 foot buffer to all areas as previously approved. As for wildlife and big game species, we are in an area where we pose no threat to wildlife or waterfowl.

109.3 Existing soil and plant resources:

We are not a threat to any endangered plant species.

109.4 Slope stability, erosion control, air quality, public health and safety:

Due to the remote location of our mining operation, we pose no thereat to public safety. Visitors, customers, and maintenance personnel will be given site-specific hazard awareness training (per MSHA regulations).

Dust created during the summer months is kept in check by spaying down the work areas with water from a water truck. Slope stability is maintained because of our two step method of pulling off the rocks.

R647-4-110

110.1 Current land use and post mining land use:

Current or pre-mining land use was pasture and some grazing. Post mine use could be pasture and grazing land.

110.2 Reclamation of roads, high walls, slopes, leach pads, dumps, etc.:

Ripping the road surface with a dozer and leaving it in a rough state and reseeding will reclaim roads.

High walls will be worked to maintain a 45 degree slope and stair stepped to insure safety and stability. The steps or benches will be back filled with overburden material and topsoil using a loader. Concurrent reclamation will be taking place as the current quarrying activities migrate into new areas. Soils and overburden material will be distributed accordingly. All will be finished off with the requisite seed mixture.

Reclaiming impoundments, pits, and pounds: N/A

Reclaiming drainage: N/A

Describe how waste dumps will be reclaimed: Waste dumps will be regarded to a 3h:1v configuration and reseeded.

Describe how shafts and adits will be reclaimed: N/A

Describe how drill holes will be reclaimed: The well will not be plugged, but used post mining for agricultural purposes.

Describe how tailings area will be reclaimed: N/A

Describe how leach pads will be reclaimed: N/A

Any stockpiled materials that are on site at the time of final reclamation will be loaded on trucks and hauled to our stone yard in Heber, UT.

110.3 Surface facilities to be left:

At the time of final reclamation no surface facilities will remain. Buildings used at the mining site are portable and will be removed to other work

sites, sold, or destroyed. Roads will be ripped and reseeded. Trash and other manmade waste material will be hauled to the proper landfill.

110.4 Treatment, location and disposition of deleterious materials:

Several hydrocarbons are used in this operation. There is an above ground gas tank and an above ground diesel tank located within a secondary containment unit for each. Other hydrocarbons onsite usually include hydraulic oil, motor oil, tube grease, and starting fluid, all of which are stored in a storage shed. No processing chemicals are used at this mining site. All of the tanks and cases of this material will be removed for the mining area at the end of reclamation.

110.5 Revegetation planting program and topsoil redistribution:

Soil material replacement: Topsoil from stockpiles will be scooped up during reclamation and spread on the surface of the quarry. Soil materials will be amended with compost. The mixture will be approximately 6"thick. Soil materials will be spread wit ha rubber tired front end loader.

Seed bed preparation: The area of the quarry will be ripped to a depth of one foot with the ripper spaced at a maximum of two feet, ad left in a very rough condition immediately prior to seeding. The compacted surfaces of the road way will be ripped to a depth of two feet and left in a very rough condition also.

Seed mixture will be that mix as approved by the DOGM of the state of Utah.

Species		Lbs/ Acre
Wyoming big sagebrush	VNS	0.1
Rocky Mountain Penstemon	Bandera	1
Orchard Grass	Paiute	2
Yellow Sweetclover	VNS	1
Forage Kochia	Immigrant	1
Saskatoon Serviceberry	VNS	1
Alfalfa	Ladak	1
Intermediate Wheatgrass	Oahe	3
Antelope Bitterbrush	VNS	1
Small Burnet	Delar	1
Thickspike Wheatgrass	Critana	2
Bluebunch Wheatgrass	Secar	2
Basin Wildrye	Trailhead	1

Seed will be broadcast and raked into the soil in the fall of the year.

Fertilization if required will be composted steer manure. It is recommended that we use composted steer manure at the rate of 5 ton per acre with soil, and 10 ton per acre with fines and overburden material.

Other revegetation procedures: None

R647-4-111 Reclamation Practices

111.5 Constructing berms/fences above high wall:

If the high wall exists at the time of reclamation, berms will be placed in these areas to warn the public of the hazard. As these berms are removed for reclamation, warning signs will be posted to alert personnel or visitors as the high wall danger.

111.6 All slopes regraded to stable configurations:

To prevent erosion, all overburden slopes should be reduced to a 3h:1v slope or less at the time of final reclamation. Topsoil and manure mixture will be distributed at the same rate noted in R647-4-110.5.

R647-4-113 Surety

Surety amount established by addressing these major tasks:

1. Clean-up and removal of structures
2. Backfilling, grading and contouring
3. Soil material redistribution and stabilization
4. Revegetation (preparation, seeding, mulching)
5. Safety gates, berms, barriers, signs, etc.

Appendix #1

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 10/13/98
Date Completed: 10/16/98

Lab Number: 98011512 Grower's Comments: Acres in Field:

Identification: Peoa

Crop to be Grown: Dryland Pasture

Soil Test Results			Interpretations	Recommendations
Texture		Loam		
Lime		+	Normal	
pH		7.2	Normal	
Salinity - ECe	mmhos/cm	1.3		
Phosphorus - P	ppm	23		0 lbs P2O5/A
Potassium - K	ppm	269		0 lbs K2O/A
Nitrate-Nitrogen - N	ppm			40-60 lbs N/A
Zinc - Zn	ppm			
Iron - Fe	ppm			
Copper - Cu	ppm			
Manganese - Mn	ppm			
Sulfate-Sulfur - S	ppm			
SAR		1.22	Soil Not Sodic	
Organic Matter	%	3.57		

Notes
> 2mm = 14.0%
Total Nitrogen = 0.155 %

For further assistance, please see your County Agent --

Nested Frequency of the Peoa Quarry (above)

Date: 10/7/98	Examiner: Jim Spencer	Quadrat Size: 1= 5cmX5cm; 2= 25cmX25cm; 3= 25cmX50cm; 4=50cmX50cm
Transect Location: Peoa quarry (above)	Number of Quadrats: 20	

Plant Species	Quadrats																				Frequency Summary by Plot Size							
																					1		2		3		4	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Hits	%Freq	Hits	%Freq	Hits	%Freq	Hits	%Freq
Epilobium brachycarpum	2	2																			0	0	2	10	2	10	2	10
Polygonum douglasii	2	2	2	3	2		1	2	2	2	2	2	1	2	2	1	2	2	2	2	3	15	18	90	19	95	19	95
Bromus tectorum	2	2	2	2	2	3	2	2	2	2	1	2	2	2	2	2			2	2	1	5	17	85	18	90	18	90
Poa bulbosa	2	1	2	4		2	2	2	2	1	2		2	2	2	2	2	1	2	3	3	15	16	80	17	85	18	90
Rosa woodsii	3	2	2	2	4					2	4	2	4		4		4		2		0	0	6	30	7	35	12	60
Bromus japonicus	3	2	3	2	2						2	3									0	0	4	20	7	35	7	35
Gutierrezia sarothrae	4	2	2		3	2	2	4	3			3				2			2	2	0	0	7	35	10	50	12	60
Verbena bracteata			4																		0	0	0	0	0	0	1	5
Arabis selbyi				3			4									4					0	0	0	0	1	5	3	15
Artemisia spicata					2	2	4	3	4	2				4	2		1	3		1	2	10	6	30	8	40	11	55
Artemisia tridentata										4	4										0	0	0	0	0	0	2	10
Orobranche corymbosa								3													0	0	0	0	1	5	1	5
Alyssum alyssioides													2								0	0	1	5	1	5	1	5
Elymus spicatus													4	1	2						1	5	2	10	2	10	3	15
Mahonia repens															2	3	2				0	0	2	10	3	15	3	15
Viguiera multiflora																			4		0	0	0	0	0	0	1	5

Cover Summary	Vegetation: 16%	Litter: 40%	Bare Ground: 31%	Gravel/Stone: 13%

Appendix #1

Nested Frequency of the Peoa Quarry (below)

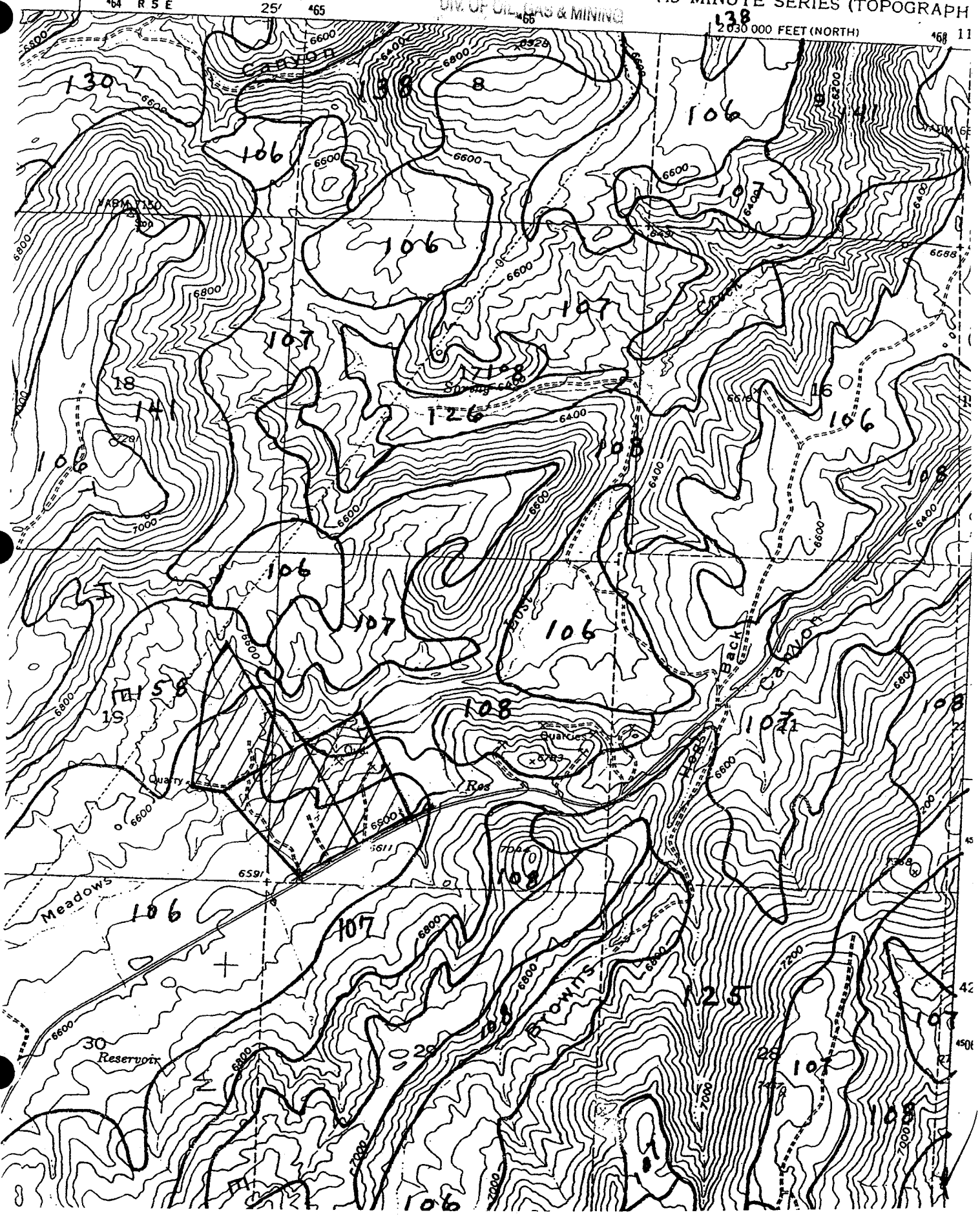
Date: 10/7/98	Examiner: Jim Spencer	Quadrat Size: 1= 5cmX5cm; 2= 25cmX25cm; 3= 25cmX50cm; 4=50cmX50cm
Transect Location: Peoa quarry (below)	Number of Quadrats: 20	

Plant Species	Quadrats																				Frequency Summary by Plot Size							
																					1		2		3		4	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Hits	%Freq	Hits	%Freq	Hits	%Freq	Hits	%Freq
Poa pretense	1		7		3	2			1	1	4	4					1	2	2	2	4	20	8	40	9	45	12	60
Juncus articus	2																				0	0	1	5	1	5	1	5
Arabis selbyi	2					2		3													0	0	2	10	3	15	3	15
Achillia millifolium	2							4	4				2	4			4			3	0	0	2	10	3	15	7	35
Polygonum douglasii	2		4			3					2	3						3	4		0	0	2	10	5	25	7	35
Epilobium brachycarpus	2		4			2		3	2			2									0	0	3	15	4	20	5	25
Elymus spicata	3	2	1	2	2			4		2	1	1	1	2	1			1	2	2	6	30	13	65	14	70	15	75
Orthocarpus tolmei	4			4	2						4								3	4	0	0	1	5	2	10	6	30
Dipsacus sylvestris	4								2												0	0	1	5	1	5	2	10
Artemisia tridentata		2	3	2	4	2		3	4	3				2				3		2	0	0	5	25	9	45	11	55
Vicia americana		4						3													0	0	0	0	1	5	2	10
Rosa woodsii			2	2	4		2				4										0	0	3	15	3	15	4	20
Mahonia repens			3		2				3	2	3		3	4							0	0	2	10	6	30	7	35
Poa bulbosa			4	4	1																1	5	1	5	1	5	3	15
Synphorocarpus oreophilus				1				4										4			1	5	1	5	1	5	3	15
Lupinus sparsiflorus					4	3															0	0	0	0	1	5	2	10
Aster chinensis						4	4	1	2				2	4							1	5	3	15	3	15	6	30
Chrysothamnus viscidiflorus							2				4	4	3	3	3	4					0	0	2	10	5	25	8	40
Tragopogon dubius							2														0	0	1	5	1	5	1	5
Geranium viscocisimum										2											0	0	1	5	1	5	1	5
Purshia tridentata														3							0	0	0	0	1	5	1	5
Verbascum thaspus															4						0	0	0	0	0	0	1	5
Amaranthus albus															3						0	0	0	0	1	5	1	5
Cover Summary	Vegetation: 23%						Litter: 48%					Bare Ground: 29%						Gravel/Stone: 0%										

Appendix #1

Appendix 1

PARK CITY EAST QUADRANG
UTAH.
7.5 MINUTE SERIES (TOPOGRAPH



Appendix #1

Non-technical soil descriptions for Summit Soil Survey:

101—Agassiz-rock outcrop complex, 30 to 70 percent slopes.
Agassiz, about 60 percent, is a shallow, somewhat excessively drained, moderately permeable soil on mountain slopes under sagebrush and grasses. Typically it is neutral very cobbly loam over limestone bedrock at 10 to 20 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 7e nonirrigated.
Rock outcrop, about 20 percent, is on ridges and escarpments.

102—Ant Flat loam, 2 to 8 percent slopes is a very deep, well drained, slowly permeable soil on fan remnants under sagebrush and grasses or cropland. Typically it is neutral loam about 13 inches thick over clay loam or clay about 17 inches thick over moderately alkaline clay loam to 60 inches or more. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 3e irrigated and nonirrigated.

103—Ant Flat loam, 8 to 15 percent slopes is a very deep, well drained, slowly permeable soil on fan remnants under sagebrush and grasses or cropland. Typically it is neutral loam about 13 inches thick over clay loam or clay about 17 inches thick over moderately alkaline clay loam to 60 inches or more. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 4e irrigated and nonirrigated.

104—Ant Flat loam, 15 to 30 percent slopes is a very deep, well drained, slowly permeable soil on fan remnants under sagebrush and grasses. Typically it is neutral loam about 13 inches thick over clay loam or clay about 17 inches thick over moderately alkaline clay loam to 60 inches or more. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 6e nonirrigated.

105—Ant Flat-Henefer-Skutum complex, 8 to 30 percent slopes.
Ant Flat, about 40 percent, is a very deep, well drained, slowly permeable soil on mountain slopes under sagebrush and grasses. Typically it is neutral loam about 13 inches thick over clay loam or clay about 17 inches thick over moderately alkaline clay loam to 60 inches or more. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 6e nonirrigated.
Henefer, about 30 percent, is a very deep, well drained, slowly permeable soil on mountain slopes under oak brush. Typically it is neutral gravelly loam about 12 inches thick over cobbly clay or clay loam about 18 inches thick over neutral or slightly alkaline very cobbly or gravelly sandy clay loam to 60 inches or more. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 6e nonirrigated.
Skutum, about 20 percent, is a deep, well drained, slowly permeable soil on mountain slopes under aspen. Typically it is neutral loam about 17 inches thick over gravelly clay or clay loam about 31 inches thick over gravelly sandy loam over sandstone bedrock at 40 to 60 inches. Precipitation is 22 to 35 inches, frost-free period is 20 to 60 days, and capability rating is 6e nonirrigated.

106—Ayoub cobbly loam, 2 to 15 percent slopes is a moderately deep, well drained, moderately slowly permeable soil on mountain slopes under sagebrush and grasses. Typically it is slightly acid cobbly loam about 6 inches thick over slightly acid or neutral gravelly clay loam about 17 inches thick over neutral very cobbly loam over andesite bedrock at 20 to 40 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 6s nonirrigated.

23" avail.

Appendix #1

107—**Ayoub-Dunford-Melling complex, 15 to 30 percent slopes.**
Ayoub, about 40 percent, is a moderately deep, well drained, moderately slowly permeable soil on mountain slopes under sagebrush and grasses. Typically it is slightly acid cobbly loam about 6 inches thick over slightly acid to neutral gravelly clay loam about 17 inches thick over neutral very cobbly loam over andesite bedrock at 20 to 40 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 6e nonirrigated.
Dunford, about 20 percent, is a moderately deep, well drained, moderately slowly permeable soil on mountain slopes under oak brush. Typically it is neutral cobbly loam about 10 inches thick over gravelly clay loam over andesite bedrock at 20 to 40 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 6e nonirrigated.
Melling, about 20 percent, is a shallow, well drained, moderately slowly permeable soil on mountain slopes under sagebrush and grasses. Typically it is neutral extremely stony loam over very cobbly clay loam over andesite bedrock at 10 to 20 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 7s nonirrigated.

108—**Ayoub-Dunford-Melling complex, 30 to 60 percent slopes.**
Ayoub, about 40 percent, is a moderately deep, well drained, moderately slowly permeable soil on mountain slopes under sagebrush and grasses. Typically it is slightly acid cobbly loam about 6 inches thick over slightly acid to neutral gravelly clay loam about 17 inches thick over neutral very cobbly loam over andesite bedrock at 20 to 40 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 7e nonirrigated.
Dunford, about 20 percent, is a moderately deep, well drained, moderately slowly permeable soil on mountain slopes under oak brush. Typically it is neutral cobbly loam about 10 inches thick over gravelly clay loam over andesite bedrock at 20 to 40 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 7e nonirrigated.
Melling, about 20 percent, is a shallow, well drained, moderately slowly permeable soil on mountain slopes under sagebrush and grasses. Typically it is neutral extremely stony loam over very cobbly clay loam over andesite bedrock at 10 to 20 inches. Precipitation is 16 to 22 inches, frost-free period is 60 to 90 days, and capability rating is 7e nonirrigated.

109—**Cluff loam, 8 to 30 percent slopes,** is a deep, well drained, slowly permeable soil on mountain slopes under mixed conifer. Typically it is slightly acid loam over gravelly loam about 9 inches thick over very gravelly loam about 7 inches thick over very cobbly clay loam about 4 inches thick over very cobbly clay over conglomerate bedrock at 40 to 60 inches. Precipitation is 22 to 35 inches, frost-free period is 20 to 60 days, and capability rating is 6e nonirrigated.

110—**Cluff loam, 30 to 60 percent slopes,** is a deep, well drained, slowly permeable soil on mountain slopes under mixed conifer. Typically it is slightly acid loam over gravelly loam about 9 inches thick over very gravelly loam about 7 inches thick over very cobbly clay loam about 4 inches thick over very cobbly clay over conglomerate bedrock at 40 to 60 inches. Precipitation is 22 to 35 inches, frost-free period is 20 to 60 days, and capability rating is 7e nonirrigated.

111—**Crandall gravelly loam, 2 to 8 percent slopes,** is a deep, well drained, moderately slowly permeable soil on mountain slopes under grasses and forbs. Typically it is neutral gravelly loam about 14 inches thick over very cobbly clay loam over slightly alkaline very cobbly loam over conglomerate bedrock at 40 to 60 inches. Precipitation is 22 to 35 inches, frost-free period is 20 to 60 days, and capability rating is 6s nonirrigated.